CLAIMS

What is claimed is:

1. A hybrid drive system, comprising:

a combustion engine;

an electric machine;

a short-time storage device;

a long-time storage device;

wherein the combustion engine and the electric machine are mechanically coupled and arranged to jointly apply a drive torque to a drive when high performance is required;

wherein the drive system is arranged such that the long-time storage and the short-time storage are charged with different charging voltages, wherein the charging voltage of the long-time storage is lower than that of the short-time storage;

wherein the short-time storage and the long-time storage are coupled by an electric valve such that, upon a supply of power to the electric machine, the electric machine is initially only supplied from the short-time storage rather than the long-time storage, thus resulting in a decrease of the voltage of the short-time storage, and that, when the voltage of the short-time storage equals or drops below the voltage of the long-time storage, the electric valve connects the short-time storage in parallel, thereby causing the subsequent supply of the electric machine to be made

from both the short-time storage and the long-time storage, wherein the supply current from the long-time storage flows through the electric valve.

2. The hybrid drive system of claim 1, wherein the electric valve comprises a diode.

3. The hybrid drive system of claim 1, wherein the electric valve comprises an electric switch controlled by a control.

4. The hybrid drive system of claim 1, wherein the short-time storage comprises a capacitor storage.

5. The hybrid drive system of claim 1, arranged such that the charging voltage of the long-time storage does not exceed 65% of the charging voltage of the short-time storage.

6. The hybrid drive of claim 1, wherein a down converter reducing the charging voltage of the long-time storage is connected between the short-time storage and the long-time storage.

7. The hybrid drive system of claim 1, wherein the electric machine is a rotary field machine controlled by a current inverter with a direct current intermediate circuit, and the short-time storage is connected in the intermediate circuit.

8. The hybrid drive system of claim 1, comprising not only the short-time storage and said long-time storage, but also an additional electrical system long-time storage.

9. The hybrid drive system of claim 7, comprising not only the short-time storage and said long-time storage, but also an additional electrical system long-time storage, and wherein the electrical system long-time storage is connected with the intermediate circuit by means of a down converter.

10. The hybrid drive system of claim 1, wherein the electric machine is seated on the crankshaft of the combustion engine and is permanently connected with it.

11. The hybrid drive system of claim 1, wherein the electric machine permanently rotates at the same rotary frequency as the combustion engine.

12. The hybrid drive system of claim 11, wherein the electric machine is also designed as a direct starter.

13. The hybrid drive system of claim 1, wherein the electric machine is also designed as a generator.

14. The hybrid drive system of claim 13, which is arranged such that the electric machine also functions as a recovery brake, wherein the electric energy recovered from the recovery brake process is at least in part stored in the short-time storage.

15. A hybrid drive system comprising:

a combustion engine;

an electric machine;

a short-time storage device;

a long-time storage device;

wherein the combustion engine and the electric machine are mechanically coupled and arranged to jointly transfer a drive torque to a drive when high performance is required;

wherein the drive system is arranged such that the long-time storage and the short-time storage are charged with different charging voltages, wherein the charging voltage of the long-time storage is lower than that of the short-time storage;

wherein a down converter providing the lower charging voltage of the long-time storage is connected between the short-time storage and the long-time storage;

wherein the short-time storage and the long-time storage are coupled by an electric valve such that, upon a supply of power to the electric machine, the electric machine is initially only supplied from the short-time storage rather than the long-time storage, thus resulting in a decrease of the voltage of the short-time storage, and that, when the voltage of the short-time storage equals or drops below the voltage of the long-time storage, the electric valve connects the short-time storage and the long-time storage in parallel, thereby causing the subsequent supply of the electric machine to be made from both the short-time storage and the long-time storage, wherein the supply current from the long-time storage flows through the electric valve.

16. A method of joint application of a drive torque in a hybrid drive system comprising a combustion engine which is mechanically connected with an electric machine, and a short-time storage and a long-time storage coupled with an electric valve, comprising:

charging the long-time storage and the short-time storage with different charging voltages before energy is drawn, in such a way that the charging voltage of the long-time storage is lower than that of the short-time storage;

withdrawing energy to drive the electric machine, whereby, because of the electric valve, a supply of power to the electric machine is initially only made from the short-time storage rather than the long-time storage, thus causing the voltage of the short-time storage to drop, and whereby the electric valve connects the short-

time storage and the long-time storage in parallel when the voltage of the short-time storage equals or drops below the voltage of the long-time storage,

resulting in a subsequent supply of power for the electric machine from both the long-time storage and the short-time storage, whereby the supply current flows from the long-time storage through the electric valve.

17. A method of joint application of a drive torque in a hybrid drive system comprising a combustion engine, which is mechanically connected with an electric machine, a short-time storage and a long-time storage coupled with an electric valve, and a down converter coupled from the short-time storage to the long-time storage, comprising:

charging, before energy is drawn, the short-time storage and, by means of the down converter, the long-time storage, resulting in the charging voltage of the long-time storage being lower than that of the short-time storage;

withdrawing energy to drive the electric machine, wherein, because of the electric valve, a supply of power to the electric machine is initially only made from the short-time storage rather than the long-time storage, thus causing the voltage of the short-time storage to drop, and whereby the electric valve connects the short-time storage and the long-time storage in parallel when the voltage of the short-time storage equals or drops below the voltage of the long-time storage, resulting in a subsequent supply of power for the electric machine from both the long-time

storage and the short-time storage, wherein the supply current flows from the long-time storage through the electric valve.